Development of the Global Historical Climatology Network Sea Level Pressure Data Set (Version 2)

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Why Version 2 and why now?

- 10 years since Version 1 was updated
- Version 1 was not subjected to rigorous quality control
- Wish to validate models and other data sets
- Desire to pursue other research questions



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Data Sources for GHCN SLP

- Electronically available sources only
- World Weather Records
- World Monthly Surface Station Climatology
- Australian Bureau of Meteorology
- Monthly Climatic Data for the World (includes CLIMAT messages via GTS)

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Process Overview

- Merge individual data sources
- Eliminate Duplicates
- Resolve remaining metadata issues
- Perform quality assurance checks
- Not homogeneity adjusted (yet)

Merge individual data sources

- Compare station data and metadata
- Some stations combined ("mingled")
  - Required *exact* match in period of overlap
  - Required excellent match in metadata
- Some stations added as new
  - Created new station when could not combine
  - Close matches considered in duplicate elimination process



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Eliminate Duplicate Stations

- Part automated, part manual
- Defining duplicate ("sameness"):
  - Floating tolerance – Values are "same" if
    - 0.1 mb if both have 0.1 resolution
    - 0.5 mb if A has 0.1 and B has 1.0 resolution
    - 1.0 mb if both have 1.0 resolution
  - Compute difference statistics:
    - Percent of overlap "same"
    - Number of runs of same values, longest run
    - Max diff, 90th, 75th, 50th, 25th, 10th percentiles, Min diff



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Eliminate Duplicate Stations (Cont'd)

- Reorder according to sameness
- Examine statistics and metadata
- Decide if duplicates
  - Most get "mingled"
  - Some remain marked as duplicates (e.g., cases where only 70% same)
- Examine stations having similar names
- Examine stations having same location
- Check for transitivity violations
  - If A = B, and B = C, but A ≠ C!
  - Manually inspect and resolve



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Resolve Remaining Metadata Issues

- **Assign correct country codes**
  - **Match with stations in other databases (GHCN Precip, WMO Vol A)**
  - **Plot locations on high resolution map**

- **Assign unique station numbers**
  - **Use WMO numbers wherever possible**
  - **For others use nearest WMO + unique modifier**



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Quality Assurance Checks

- Suspect values saved in separate file
- Manual inspection via plotting
  - Examine each time series
  - Examine difference series with neighbors
  - Look for mislocated or otherwise problematic stations (184 identified and removed)
- Reasonable range check
  - Values outside range 860-1090 mb
    (97 values involving 82 stations)



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Quality Assurance Checks (Cont'd)

- Gross errors using digital checks
  - Different years having largely the same data (5 stations involved)
  - Runs of identical consecutive values (71 runs involving 60 stations)
  - Runs of same value for a fixed month across all years (748 cases involving 459 stations)



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Quality Assurance Checks (Cont'd)

- Checks for statistically wild outliers
  - z scores based upon biweight mean and std dev
  - z scores > 5 flagged (298 points)
  - 3.5 < z scores < 5 flagged …
    if neighbor's z score < 3.5 (456 points)
  - Percent of data set flagged = 0.08%



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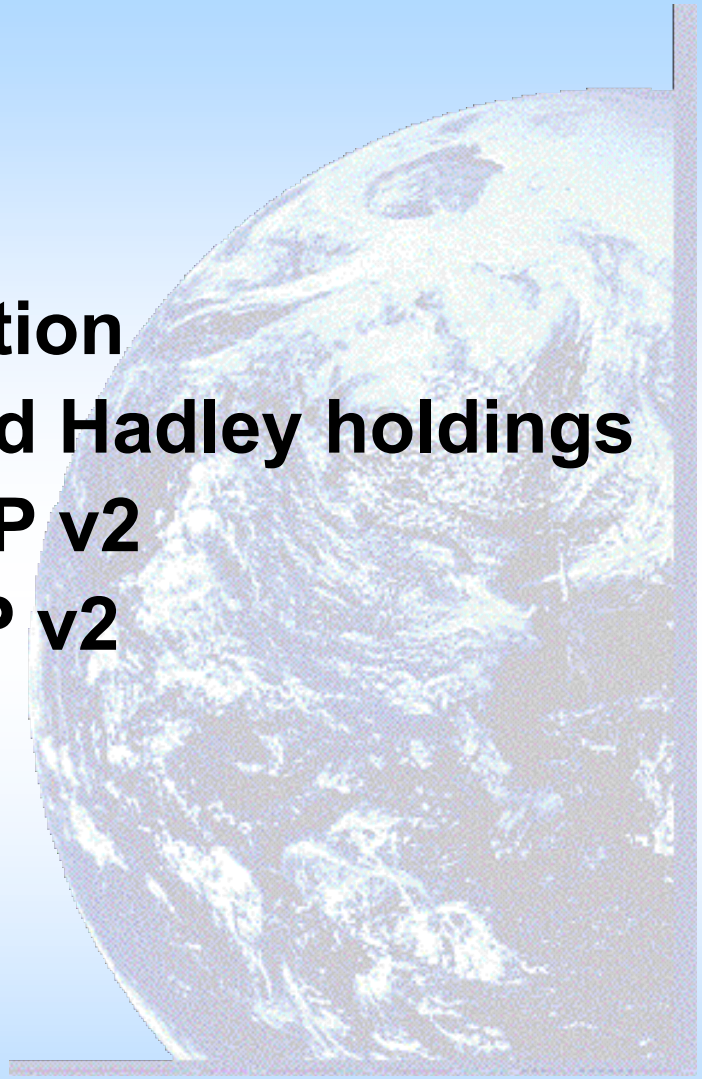
Data Set Summary

- Map of station locations
- Period of record information
- Comparison of GHCN and Hadley holdings
- List of files for GHCN SLP v2
- How to obtain GHCN SLP v2
- Future SLP work



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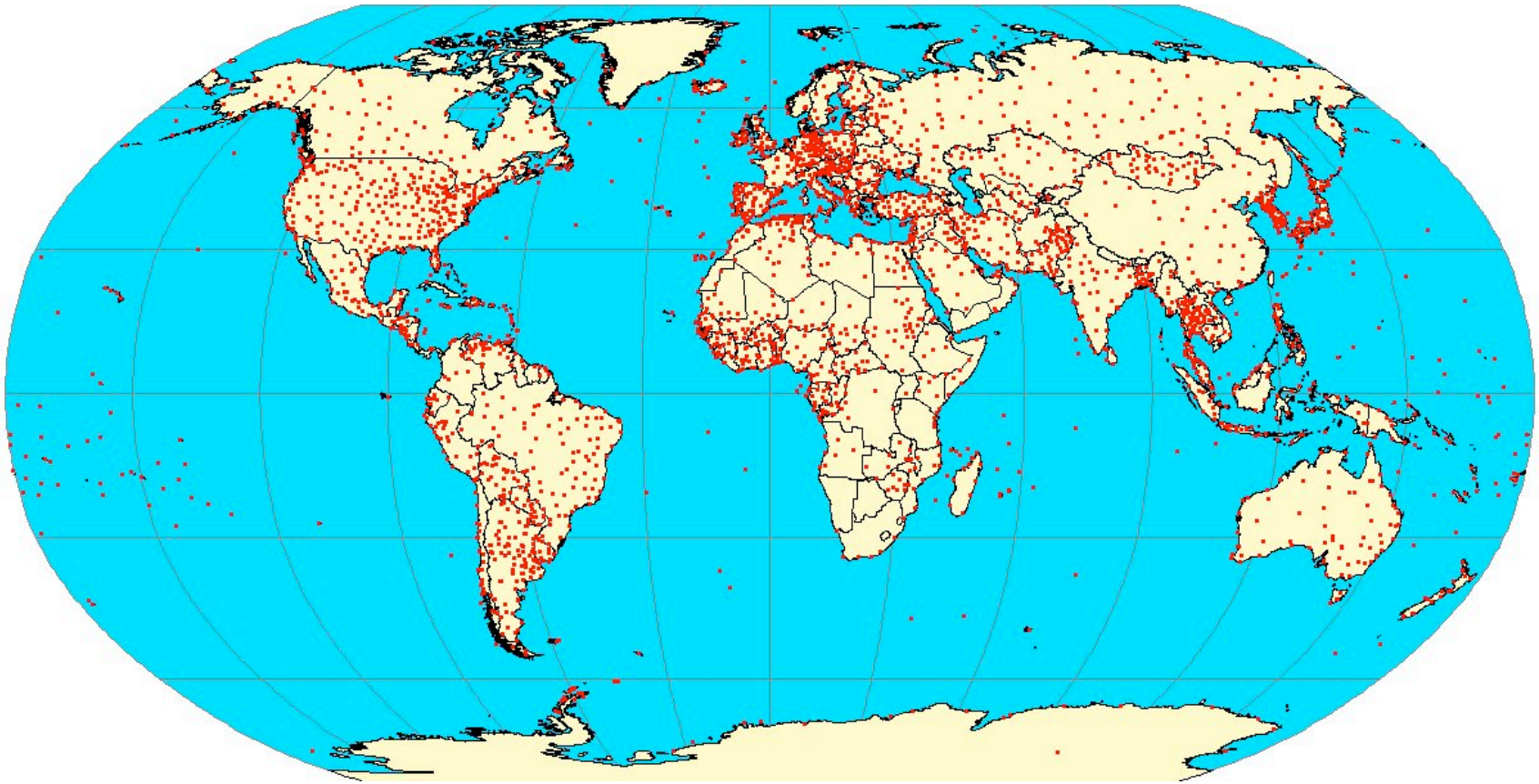
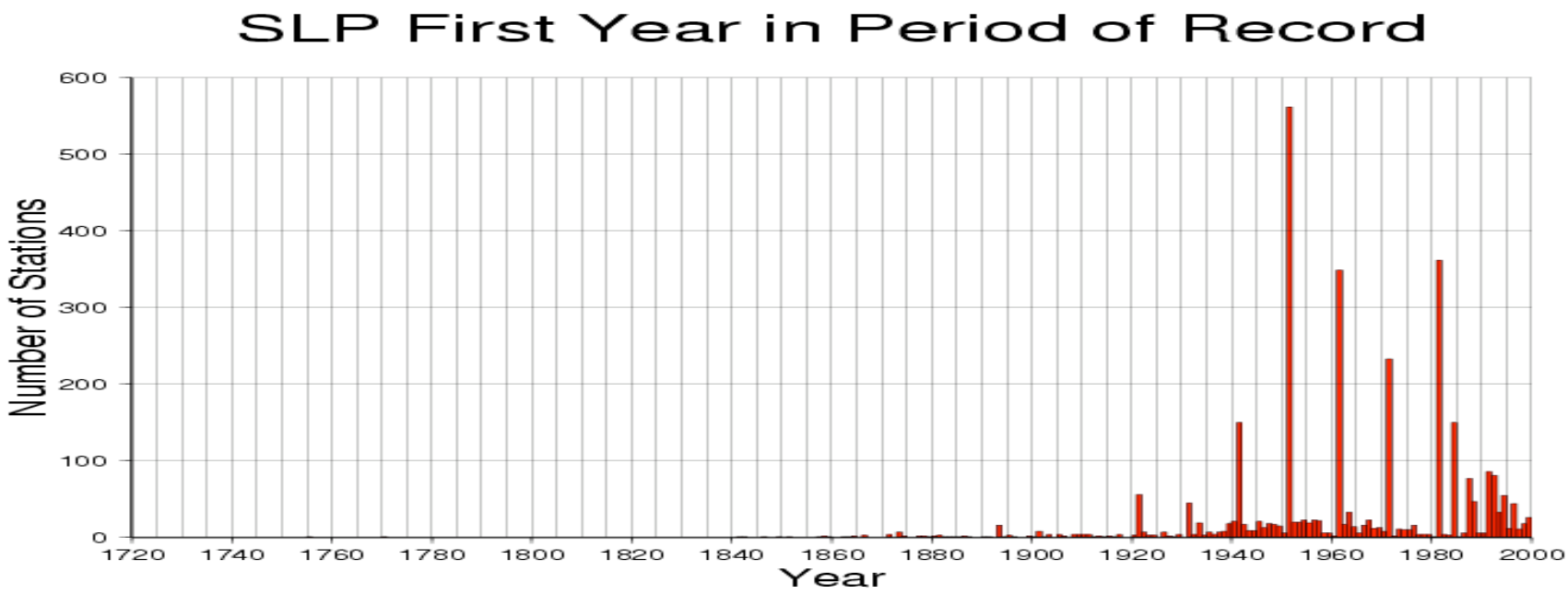
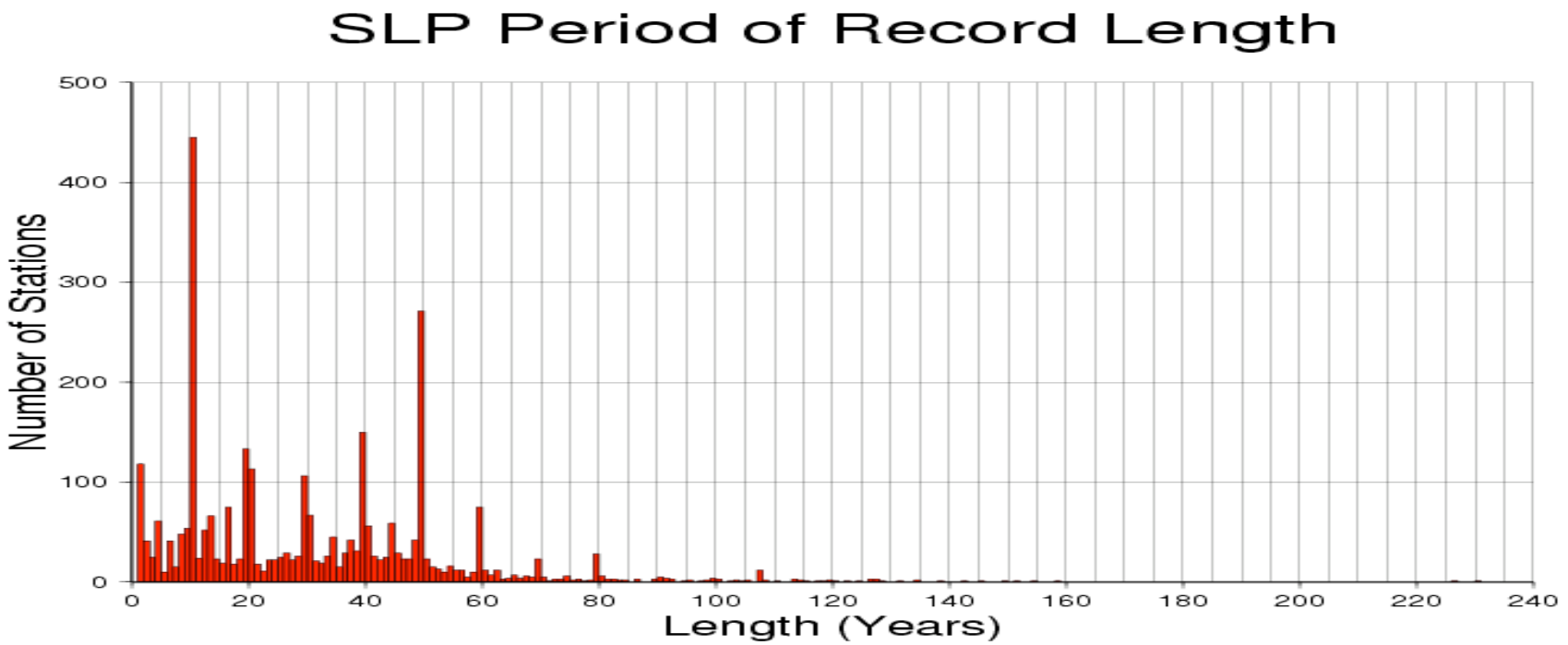
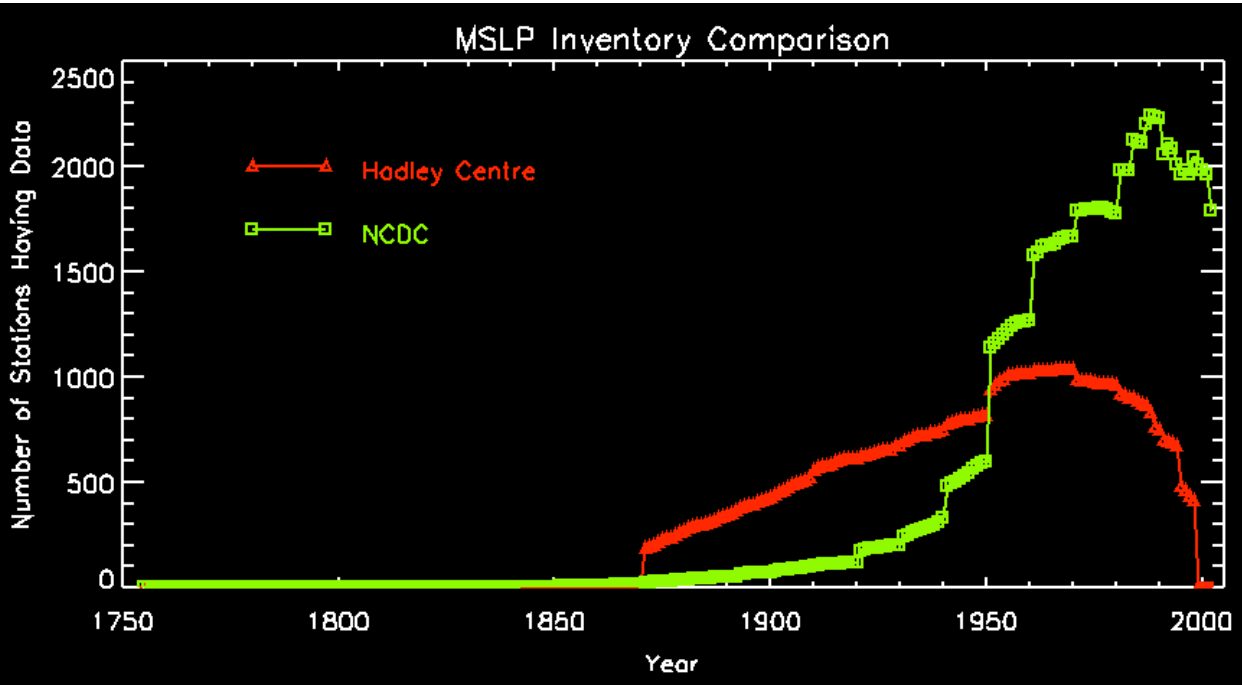
GHCN Pressure Stations

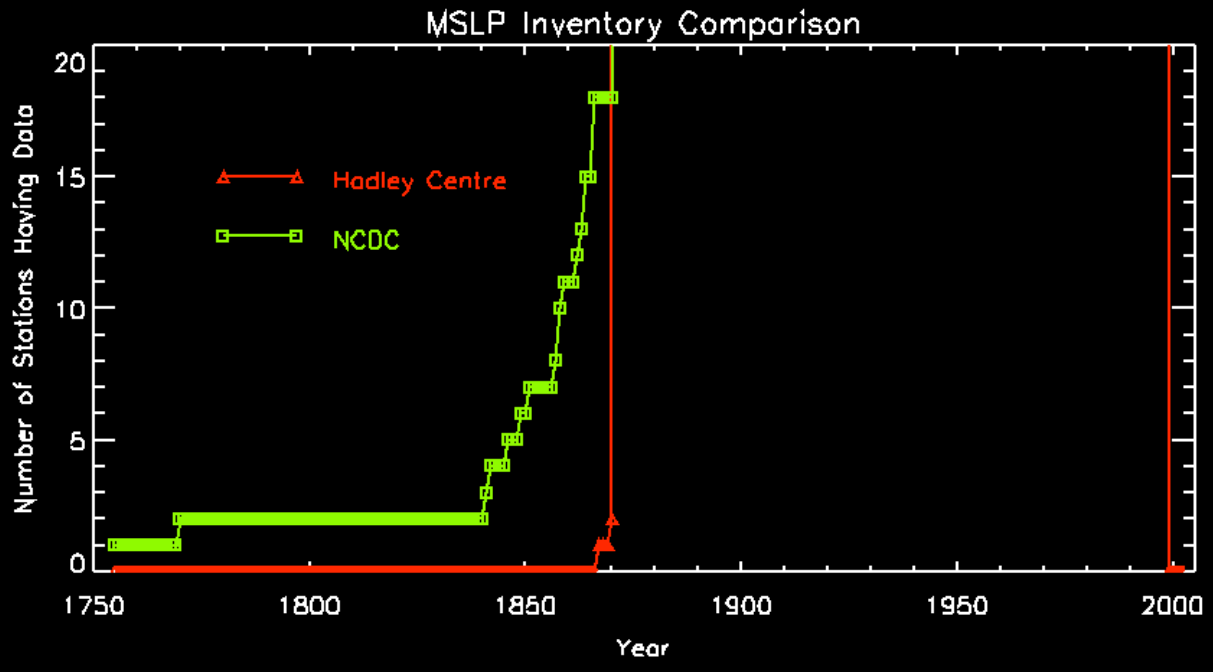
(Nstations = 2668)




SLP First Year in Period of Record
Number of Stations
0
100
200
300
400
500
600
1720
1740
1760
1780
1800
1820
1840
1860
1880
1900
1920
1940
1960
1980
2000
Year


SLP Period of Record Length
Number of Stations
0
100
200
300
400
500
0
20
40
60
80
100
120
140
160
180
200
220
240
Length (Years)


MSLP Inventory Comparison
Number of Stations Having Data
2500
2000
1500
1000
500
0
Hadley Centre
NCDC
1750
1800
1850
1900
1950
2000
Year


MSLP Inventory Comparison
Number of Stations Having Data
20
15
10
5
0
Hadley Centre
NCDC
1750
1800
1850
1900
1950
2000
Year


NOAA

GHCN SLP Files

Filename	Contents
readme.slp.v2	Format descriptions
v2.slp.Z	Main data file
v2.slp.inv.Z	"Inventory" file containing station metadata
v2.slp.country.codes	Country code/name cross reference
v2.slp.failed.qc.Z	Values edited from main file by QC process



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Obtaining GHCN SLP Files

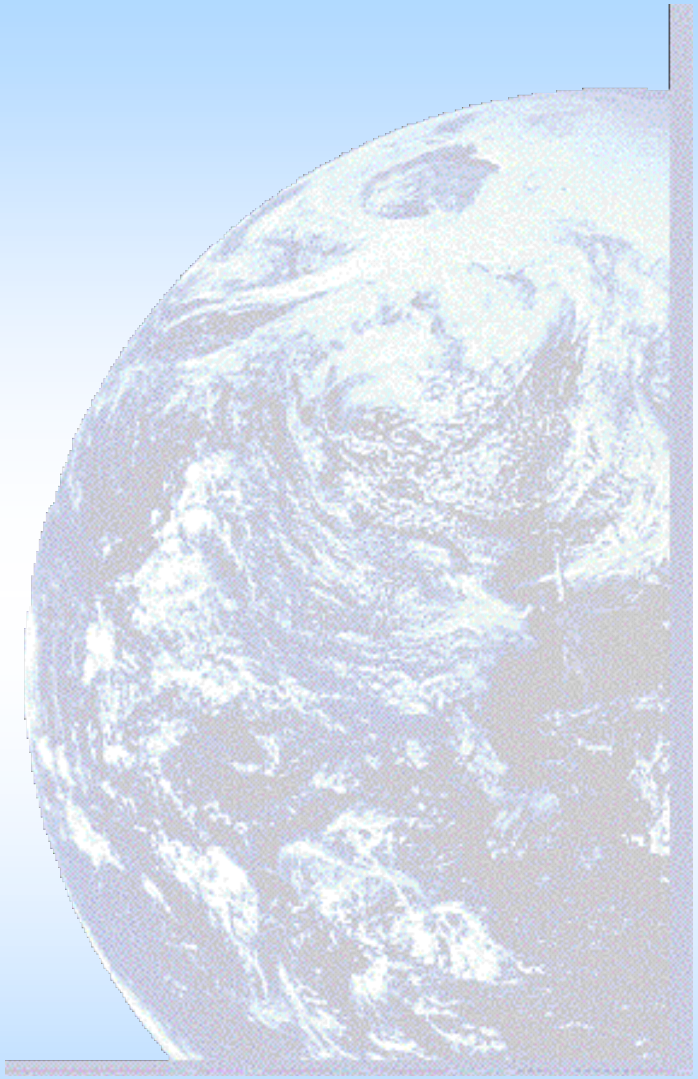
ftp ftp.ncdc.noaa.gov

ftp> **cd /pub/data/ghcn/v2**

ftp> **prompt**

ftp> **mget *slp***

ftp> **bye**



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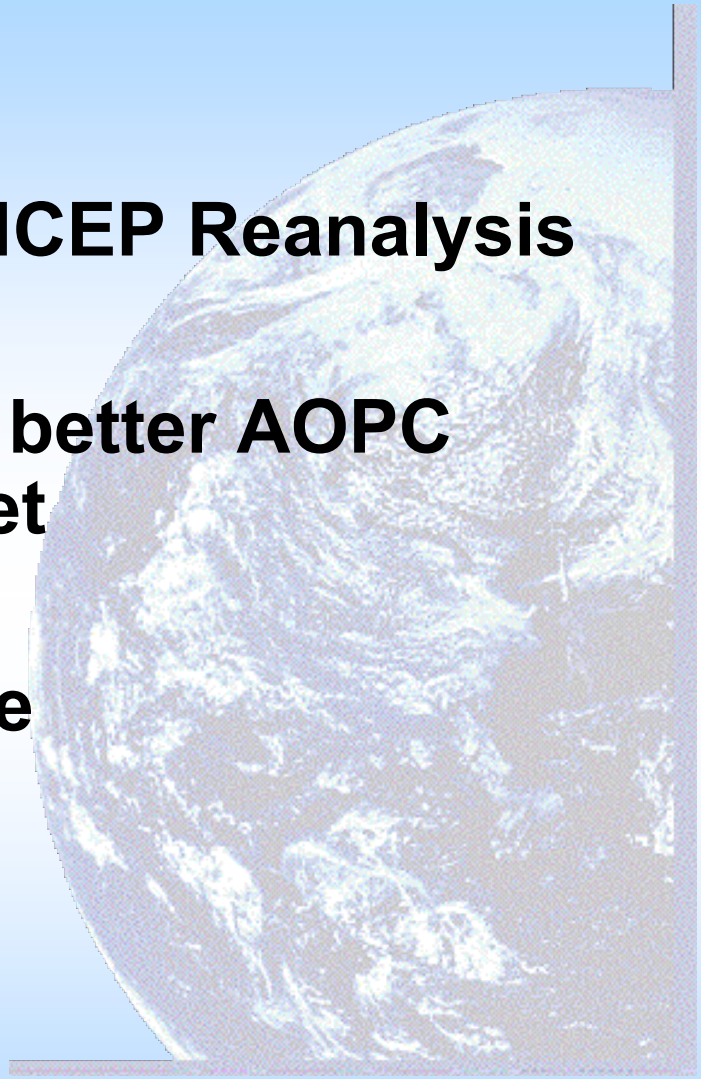
What next?

- Compare with HadSLP, NCEP Reanalysis
- Contribute to bigger and better AOPC Multinational SLP data set
- Suggestions are welcome



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